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The Value of the Rapid Whole Blood-stained Antigen Agglutination Test in the Eradication of Pullorum Disease

R. F. GORDON and G. C. BRANDER,

WEYBRIDGE

History and Introduction

S. pullorum, the causative organism of pullorum disease (B.W.D.), was first described by Rettger in 1900. Its relationship to the disease was established by him in 1901, and in 1911 Rettger and Stoneburn were able to demonstrate the cycle of infection from adult to chick via the egg. Since that time the main efforts in the eradication of this disease have been by the elimination of adult carrier birds from the breeding stock. In an attempt to diagnose the disease in adult birds Rettger first tried the microscopic agglutination test, but abandoned it as impracticable. Jones (1913) was the first to make use of the macroscopic tube agglutination test in the control of pullorum disease and its value was established by Rettger, Kirkpatrick and Jones in 1914. Since then the serum-tube agglutination test has been adopted in most countries, and has been recognised as the official method of detecting carriers of pullorum disease. In 1926, Huddleson and Carlson reported on a rapid agglutination test for the diagnosis of Bang's disease in cattle. Known quantities of serum and antigen were mixed on a plate, a reaction being shown by the clumping or flocculation of the bacteria. Runnels, Coon, Farley and Thorp (1927) adopted this method for use in pullorum disease in poultry, and in 1929, Bunyea, Hall and Dorset further modified Huddleson's plate method for use in the field, by using a drop of whole blood mixed on a plate with a known quantity of a dense suspension of live *pullorum* organisms.

Further experiments were carried out in an attempt to improve the antigen and technique, and in 1930, Schaffer, MacDonald, Hall and Bunyea described a killed antigen stained by crystal violet, and in addition advocated the use of a wire loop for measuring the blood. Coburn and Stafseth (1931) further modified the antigen by adding 0·5 per cent. phenol and gentian violet, and used standardised dropper pipettes for measuring the blood and antigen.

In 1932 Bunyea and Hall tested 206 chickens by the rapid, whole-blood, stained-antigen test, and by the serum-tube test, and the entire flock was killed and *post-mortem* and bacteriological examinations carried out.

Of the 206 fowls tested by both methods there was an agreement in 188, or 91 per cent. Of the 18 disagreements, 13 were positive to the tube test and negative to the rapid test, and five *vice versa*, and of the 13 positive to the tube test and negative to the rapid test only two were shown to harbour *S. pullorum*.

Durant (1932) tested 259 fowls by the serum-tube test, the rapid-antigen serum test and the rapid-antigen, whole-blood test, and the results were checked by *post-mortem* and bacteriological examinations. The rapid-antigen serum test and the rapid antigen whole-blood tests were not so efficient as the tube test, but the rapid serum test gave better results than the rapid whole-blood test. The cultural findings showed the slow tube test to be more reliable than the rapid antigen tests, and 8 out of 12 birds that gave a slight granular reaction to the slow tube test, but were negative to the rapid antigen whole-blood test, were found to yield *S. pullorum*.

Beilby and Roach (1932) tested 20 flocks, involving a total of 2,932 fowls, by the rapid, whole-blood test applied in the field, and by the rapid serum antigen test carried out in the laboratory, and found an agreement of 98·7 per cent. The results obtained with the rapid whole-blood test for pullorum disease applied in the field, agreed closely with the results secured with the rapid serum agglutination test applied in the laboratory. The accuracy of the diagnosis was found to depend upon the training and experience of the technician. When the whole-blood test was applied by inexperienced persons, the results obtained differed from the laboratory test by 12 per cent., as compared with a difference of 1·3 per cent. when the whole-blood agglutination test was applied by an experienced technician.

The rapid, whole-blood agglutination test was found to lend itself very readily to practical application in the field, and its extremely low cost made feasible the application and repetition of the test on a large scale.

Bleecker (1931) obtained 91·15 per cent. agreement with 2,159 birds when tested by the rapid, whole-blood and tube agglutination tests. Most of the discrepancies occurred when testing the first few flocks, and may have been due to inexperience in interpreting the results of the rapid whole-blood test. At the close of the experiment he obtained almost identical results with the two tests, and concluded that in the hands of an experienced operator the whole-blood agglutination test is fully as efficient as the tube agglutination test.

Bunyea, H. (1934) tested four commercial flocks for pullorum disease by the stained-antigen, whole-blood agglutination test and by the pullorin test. In addition, the serum tube test was used on three of the flocks as a check on the reliability of the rapid whole-blood method. Specimen birds from these flocks were examined *post-mortem* and bacteriologically, and the results compared with the test findings. The average agreement between the rapid whole-blood test and the tube test was 94·4 per cent., thus supporting the reliability of the rapid test, while there was an agreement of 81·2 per cent. between the rapid test and the bacteriological findings. The results obtained with pullorin were unsatisfactory.

Barger and Torrey (1933) state that in the routine testing of flocks the rapid whole-blood test approached an efficiency of nearly 100 per cent., using the tube test as an arbitrary standard of perfection; but that in untrained hands the rapid whole-blood test is unreliable. This article also contains an excellent description of the technique of the rapid whole-blood test as applied in the field.

Schaffer and Bunyea (1934) report extensive field tests of the whole-blood, stained-antigen method carried out in co-operation with State officials and other experienced workers in U.S.A. More than 500,000 tests have been made with most favourable results. In one State 190,000 chickens were tested by the stained method and by the tube method, and the disagreement between the results of the two tests was 6·5 per cent., the tube method accounting for a slightly greater percentage of reactors than the stained antigen method. In another State, after comparative tests with the "tube" method and the stained-antigen, whole-blood method, the "tube" test was discarded and the stained-antigen method used to test 105,000 chickens. Retests were made after 6–12 weeks on all flocks showing infection. In this case the State officials, after comparing the results obtained with the serum-tube method in former years, reported: "We are satisfied that for practical purposes, under field conditions this test is as accurate as the 'tube' method."

Gwatwin *et al.* (1941) carried out comparative tests for *S. pullorum* by the whole-blood and tube agglutination tests on a total of 3,861 birds, and found an agreement of 92·41 per cent. between the two methods. Bacteriological examination of 12 birds positive to the whole-blood method only yielded *S. pullorum* from one bird, while the organism was recovered from two out of five birds that were positive to the tube test only. They consider that under the weather conditions and transportation difficulties of Alberta, the whole-blood test in competent hands could be used in a pullorum-disease control programme with as satisfactory results as the tube method.

In concluding this survey of the literature we would like to quote verbatim the final paragraphs of the article by Schaffer and Bunyea (1934) on the "Progress of the Rapid Whole-Blood Agglutination Test for Pullorum Disease in the United States." "Large scale experiments, of various kinds, have been carried out in a number of other States and as a result several of the States have adopted the rapid whole-blood stained-antigen method as an official method in their pullorum-disease control programmes. Some States have trained veterinarians to carry on pullorum disease testing for official accreditation of flocks in their respective localities.

"In July, 1931, a patent relating to stained antigen was issued to Schaffer who, in turn, assigned the rights to the Secretary of Agriculture. In order that this process might be available to those who wished to manufacture the stained antigen for pullorum-disease testing work, the Secretary has issued, without charge, to properly equipped laboratories, permits to produce the stained antigen. These permits are issued only after the commercial concern has entered into an agreement to produce the antigen in accordance with the rules of the Chief of the Bureau of Animal Industry. In this way it was hoped to have available to the user a satisfactory stained antigen at a reasonable price. At the present time about 25 commercial concerns are producing the antigen for sale to the poultryman and veterinarian.

"Evidence is accumulating which indicates that this simplified method will prove of much value to the poultryman. Its low cost, simplicity and adaptability to field use, encourage more poultrymen to test and make it possible to carry on extensive testing programmes. The fowls need be handled only with a minimum of interference with their normal productivity. Leg banding is not necessary, and immediate disposal of reactors is possible. Moreover, the rapid whole-blood method eliminates difficulties caused by spoiled, haemolysed or jellied blood samples; cloudy serum, broken bottles, detached or lost labels and duplication of records, all of which complicate the tube test."

It is obvious from various letters, lay articles, and controversies observed in the popular poultry press of this country that the rapid, whole-blood, stained-antigen test has been widely used in Great Britain, particularly in Lancashire, for the last few years, under such names as "The Slide Test," "Hot-spot Test," and other trade names. There do not appear, however, to be any recorded scientific data on the value or efficiency of the test under field conditions in this country.

About two years ago a preliminary test of the accuracy of the rapid stained-antigen method was carried out by one of us (R. F. G.) in conjunction with D. L. Hughes, now of the Agricultural Research Council Experimental Farm, Compton. A total of 1,596 samples of sera were tested by both the rapid, stained-antigen method, and the routine serum-tube test, and an agreement of 96·55 per cent. between the two tests was established. As equal numbers of negative and positive sera were tested the results were considered to have some significance. Unfortunately at that time it was only found possible to carry out some 126 tests with whole blood, when an agreement of 93·65 per cent. with the routine tube test was found. These results were so encouraging that it was decided to test the accuracy of the rapid, whole-blood, stained-antigen test under field conditions, and to compare its accuracy with the routine tube method, and it was for this purpose that the present experiment was designed. Three flocks known to be fairly heavily infected with pullorum disease were tested by the whole-blood, stained-antigen method, and the serum tube test, and all birds in which conflicting results were recorded were purchased, and killed for *post-mortem* and bacteriological examination, the recovery of the organism from the carcase being regarded as the criterion of infection.

Preparation and Use of the Antigens Employed

The Stained Antigen.—This antigen was prepared according to the technique of Schaffer, Macdonald, Hall and Bunyea (1931) with slight modifications. The same six strains of *S. pullorum* were used as in the antigen employed for the routine tube test. Six agar Roux flasks were inoculated by means of a Pasteur pipette with 4 c.c. each of peptone broth cultures of the above strains and incubated for 36 hours at 37° C. The resultant growths were washed off with 5 c.c. of sterile phenol-formolised saline and glass beads, and filtered through glass wool. The phenol-formalin solution was prepared from equal quantities of A.R. phenol and 40 per cent. formaldehyde, and added to the saline in the proportion of 0·25 per cent. The filtered suspensions were killed by placing in the water bath for 90 minutes at 56° C. Each strain was then tested for sterility and agglutinability, and finally all were mixed and adjusted to correspond to 30 times tube No. 1 of the Brown scale. To each 100 c.c. of the suspension there was added 3 c.c. of a 1 per cent. watery solution of crystal violet, giving a final dye dilution of 0·03 per cent. The antigen was then tested on plates against whole blood from reactor fowls of known titre, and from fowls known to be negative.

For use in the field the antigen was first placed in drop bottles set to deliver a drop of approximately 0·04 c.c.; but finally a pipette, delivering the same quantity, was found to be more satisfactory. The blood was collected from the wing vein in a wire loop fitted to a bacteriological needle holder. The loop was made from nicrome wire S.W.G. No. 19 and had an internal diameter of 3 mm., delivering approximately 0·02 c.c. of blood. The tests were read on porcelain tiles divided into 25 squares, each 1 inch square. The drop of antigen was placed in the centre of the square and the loopful of blood mixed into it by stirring about 12 times, and spreading the mixture out to the size of a shilling. After every five tests the plate was rotated and the tests read. A positive reaction was shown by well-marked aggregation of the stained antigen into clumps, with clear interspaces, within 2 minutes; marked granularity without clearing, if within 2 minutes, was also regarded as positive. Minute flocculations at the margins were considered negative, while any reaction occurring after 2 minutes was ignored. This time factor appears to be of importance. Heating the testing plate did not appear necessary, and was not carried out. After the testing plate was filled it was rinsed in tepid water and thoroughly dried. The blood-collecting loop was rinsed in carbolised saline and wiped on a clean cloth between each two tests. In very warm weather it was found necessary to shade the plate in order to prevent too rapid evaporation. Similarly in wet weather some form of shelter is required to protect the tests, and experiments are in progress to find the most suitable type of testing equipment.

Preparation of the Routine S. pullorum antigen for the Macroscopic Tube Test.—Six litre flasks of peptone broth were inoculated by loop from the same six strains of *S. pullorum* used in the preparation of the rapid antigen. The flasks were incubated for 36 hours at 37° C. and killed by the addition of 0·25 per cent. of the phenol-formalin mixture and reincubated for a further 12 hours. Each flask was tested for sterility and agglutinability, then all were mixed and similar tests carried out.

A dense saline suspension was prepared on Roux flasks in a manner similar to that used for the stained antigen. This dense suspension was then added to the broth antigen in sufficient quantity to bring the density up to between tubes 0·5 and 1 of the Brown scale. The tests were set up in two dilutions, 1 in 20 and 1 in 50, and incubated for 18 hours before reading.

Testing Results

Three farms known to contain a fairly high percentage of reactors, and involving a total of 1,750 birds, were tested. The rapid whole-blood test in the field was carried out and interpreted in all cases by one of us, and at the same time blood samples were taken from each bird and sent to the laboratory the same day, when they were tested by the routine serum tube test. All the results were again read by one of us, who at the time was unaware of the result of the rapid test, and therefore unbiased in his interpretations.

Farm I

A total of 602 birds were tested, with the results shown in Table I.

Table I

Negative to both tests	554	Percentage agreement	98·83
Positive " "	41		
Discrepancies	7	" disagreement	1·17
	602		100·00

Of the seven discrepancies, all were negative to the whole-blood, stained-antigen test and positive to the serum-tube test.

Farm II

On this farm 788 fowls were tested and the results are shown in Table II.

Table II

Negative to both tests	624	Percentage agreement	97·96
Positive " "	148		
Discrepancies	16	" disagreement	2·04
Total tested	788		100·00

Of these 16 discrepancies, 12 were negative to the rapid whole-blood test and positive to the serum-tube test, while four were positive to the rapid test and negative to the serum-tube test.

Farm III

Here 360 fowls were tested, with results shown in Table III.

Table III

Negative to both tests	330	Percentage agreement	98·33
Positive " "	24		
Discrepancies	6	" disagreement	1·67
Total tested	360		100·00

Of these six discrepancies, four were negative to the rapid whole-blood test and positive to the serum-tube test, and two *vice versa*.

The total number of birds tested by both methods was therefore 1,750, and there was complete agreement in 1,721 cases, or 98·34 per cent., and disagreement in 29, or 1·66 per cent. The results of the testing on all of these farms are shown in Table IV, and graphically in Table V.

Table IV

Negative to both tests	1,508	Percentage agreement	98·34
Positive " "	213		
Disagreements	29	" disagreement	1·66
Total	1,750		100·00

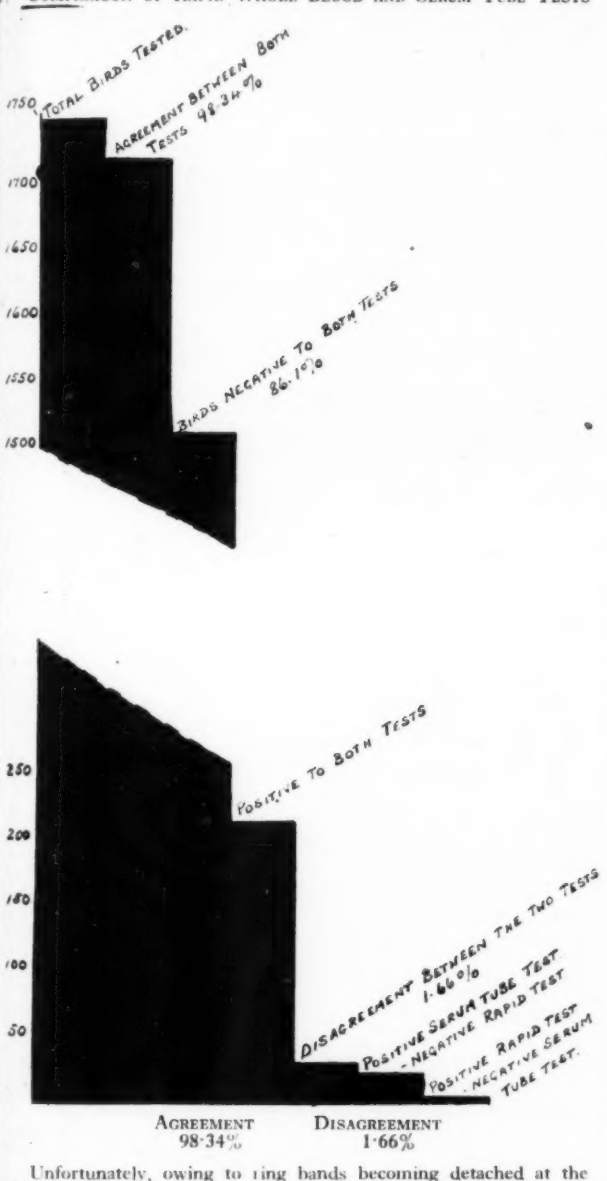
The distribution of the 29 birds in which were was disagreement between the two tests was as follows:—

(1) Positive to serum-tube test and negative to rapid whole-blood test ... ... — 23

(2) Negative to serum-tube test and positive to rapid whole-blood test ... ... — 6

TABLE V

COMPARISON OF RAPID WHOLE BLOOD AND SERUM TUBE TESTS



Unfortunately, owing to ring bands becoming detached at the farm after the testing was carried out, three of these birds could not be identified, and only 26 were obtained. Of these 26, 22 had been positive to the serum-tube test and negative to the rapid test, and four *vice versa*. These 26 birds in which conflicting results had been obtained were tested again by both methods at the laboratory, and of the 22 birds originally negative to the rapid whole-blood test, nine at further tests gave consistently good positive results, while five birds which had given positive reactions to the serum-tube test, at later serum tube tests gave negative results. Conversely, all four birds which gave positive results to the rapid whole blood test and negative results to the serum-tube test, subsequently gave positive reactions to the later serum-tube tests. All these birds were subsequently destroyed and submitted to *post-mortem* and bacteriological examinations.

Post-mortem and Bacteriological Examinations

On *post-mortem* examination, cultures were taken as a routine measure in all cases from the following organs: liver, spleen, gall bladder, bone marrow and ovary. Cultures were also taken from any pathological lesions observed in these or other organs. With the exception of those from the ovary, all primary cultures were made by the inoculation of agar slopes and peptone broth tubes. In the case of the ovary, the whole organ was ground up in a bacteriological mincer, and the material filtered through glass wool into 50 c.c. flasks of peptone broth to which brilliant green had been added in a concentration of 1 in 75,000. The brilliant green broth was incubated overnight at 37° C. and subcultured on MacConkey plates. Where obviously degenerate ova were present, primary cultures were made by inoculation of agar slopes and peptone broth tubes with loopfuls of material from the degenerate ova, the remainder of the ovary then being minced as usual.

The results of the field and laboratory tests and of the *post-mortem* and bacteriological examinations are recorded in Table VI.

TABLE VI

Bird No.	Rapid whole blood test		Serum tube test		*Post-mortem* findings	Bacteriological findings
			At Weybridge			
	In Field	At Weybridge	1st test	2nd test	+ indicates ovarian lesions	+ indicates *S. pullorum* isolated
1 3571	—	—	+	+	+	+ ovary
2 98	—	—	+	+	+	+ "
3 301	—	—	+	+	+	+ "
4 2063	—	—	+	+	+	+ "
5 2127	—	—	+	+	+	+ "
6 3442	—	—	+	+	—	+ liver spleen
7 39	—	—	+	+	—	+ gall bladder
8 3412	—	—	+	+	—	—
9 3515	—	+	+	+	+	+ ovary
10 3978	—	+	+	+	+	+ "
11 92	—	+	+	+	+	+ "
12 3471	—	+	+	+	+	+ "
13 3489	—	+	+	+	+	+ "
14 3457	—	+	+	+	+	+ "
15 3496	—	+	+	+	+	+ " spleen
16 3361	—	+	+	+	+	—
17 3357	—	+	+	+	—	—
18 3368	—	—	+	—	—	—
19 3380	—	—	+	—	—	—
20 3752	—	—	+	—	—	—
21 3467	—	—	+	—	—	—
22 3493	—	—	+	—	—	—
23 3277	+	+	—	+	+	+ ovary
24 3290	+	+	—	+	+	—
25 3169	+	+	—	+	+	—
26 3280	+	+	—	+	—	—

It is of interest to note from Table VI that *S. pullorum* was recovered from all birds, except three, which showed ovarian lesions, while conversely, the organism was only recovered from two birds which showed no macroscopic lesions of the ovary, in these cases from the gall bladder wall, and liver and spleen, respectively.

Of the 26 birds examined, *S. pullorum* was recovered from 15, while a further three birds showed *post-mortem* lesions suggestive of pullorum infection.

It will be seen from the testing results of the 15 fowls from which *S. pullorum* was recovered that 14 had given a positive reaction to the serum-tube test and negative to the rapid test, and one fowl the converse results. That is, the rapid whole-blood test failed to detect 14 fowls definitely shown to be infected, and the serum tube-test only one. Of the three fowls which showed macroscopic lesions only, two had given positive reactions to the whole-blood test and negative to the serum tube, and one *vice versa*. Of the remaining eight fowls which showed no *post-mortem* lesions, and from which the organism was not recovered, seven had been positive to the serum-tube test and negative to the whole-blood test, and one had given the converse result.

CONCLUSIONS

Three flocks, involving a total of 1,750 tests with approximately 13 per cent. of reactor birds, were tested by both the serum-tube test and the whole-blood, stained-antigen test, and an agreement between the two tests of 98·34 per cent. was established. Twenty-six of the 29 birds which gave conflicting results were examined bacteriologically, and *S. pullorum* was recovered from the tissues of 15. Of these 15 birds, which were found to be definitely affected with pullorum disease, the rapid whole-blood test had failed to detect 14, and the serum-tube test only one. On the other hand, the serum-tube test may have wrongly condemned eight birds from which the organism was not subsequently recovered, and the rapid test three, and in this respect it should be borne in mind that although the isolation of the organism from a carcase indicates definite infection, the converse does not hold. These results cannot fairly be presented as percentages as it is a much graver error to pass one affected bird than to condemn ten non-affected.

However, if we consider the birds in which both tests agreed, to be definitely affected plus the birds from which the organism was recovered, then the rapid test failed to detect 14 reactors in a total

of 228 reactors, an error of 6·1 per cent., while the serum tube test only failed to detect one, or 0·4 per cent.

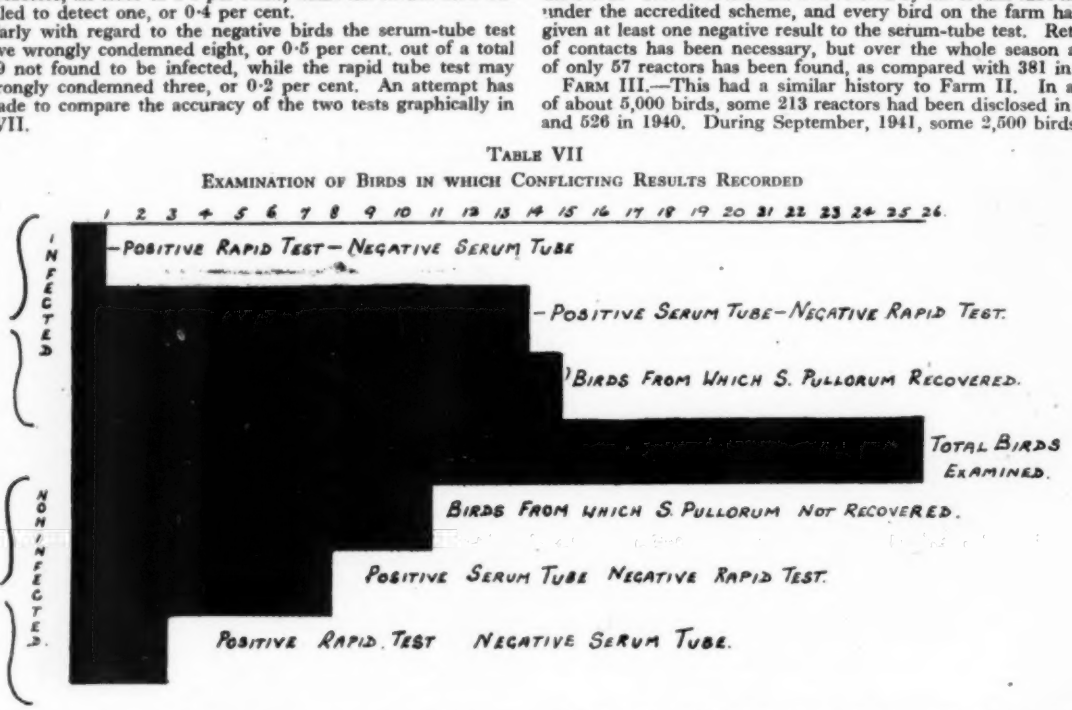
Similarly with regard to the negative birds the serum-tube test may have wrongly condemned eight, or 0·5 per cent. out of a total of 1,519 not found to be infected, while the rapid tube test may have wrongly condemned three, or 0·2 per cent. An attempt has been made to compare the accuracy of the two tests graphically in Table VII.

disclosed. The flock has now been tested by the serum-tube method under the accredited scheme, and every bird on the farm has now given at least one negative result to the serum-tube test. Retesting of contacts has been necessary, but over the whole season a total of only 57 reactors has been found, as compared with 381 in 1940.

Farm III.—This had a similar history to Farm II. In a flock of about 5,000 birds, some 213 reactors had been disclosed in 1939, and 526 in 1940. During September, 1941, some 2,500 birds were

Table VII

Examination of Birds in which Conflicting Results Recorded


1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26
INFECTED
NON-INFECTED
Positive Rapid Test—Negative Serum Tube
Positive Serum Tube—Negative Rapid Test
Birds from which S. Pullorum Recovered.
Total Birds Examined.
Birds from which S. Pullorum not Recovered.
Positive Serum Tube Negative Rapid Test.
Positive Rapid Test Negative Serum Tube.

It will thus be seen that although there was close agreement between the two tests, the rapid whole-blood test was definitely less effective than the serum-tube test in the detection of infected birds. In fairness to the rapid test, however, it should be pointed out that under laboratory conditions a much closer agreement was obtained (see Table VI). This may have been due to improvement in technique due to increased experience in testing, or more probably to the better conditions under which the tests were carried out, and the longer time spent in testing each bird.

There were at these laboratory tests only eight real discrepancies, an agreement of 99·31 per cent. between the two tests, and of these eight birds, all had given a positive reaction to the serum-tube test and negative to the rapid whole-blood test. On bacteriological examination, *S. pullorum* was isolated from seven out of the eight birds, so that under laboratory conditions the whole-blood test failed to detect seven infected birds, and the routine tube test none.

Subsequent to the completion of these experiments, the rapid whole-blood test was used on three fairly heavily infected farms, in an attempt to eliminate reactors, or at least to reduce them to a reasonable number, before official testing under the accredited poultry breeding scheme commenced.

In all three farms there had been a history of repeated testing over a number of years by the serum-tube method without any substantial reduction in the number of reactors, mainly owing to lack of co-operation on the part of the owners. In each case the results obtained with the rapid whole-blood test were most encouraging.

Farm I.—In a flock of about 700 birds, 97 reactors had been disclosed by the serum-tube test during 1940. In May, 1941, 600 adult birds were tested by the rapid whole-blood method and 30 reactors removed, and at a subsequent rapid test, one month later, six further reactors were eliminated. The flock has since been tested under the accreditation scheme by the serum-tube test, with completely negative results.

Farm II.—In this flock there was a history of persistent reactors over a period of three years, despite fortnightly testing of the flock throughout the testing season, by the serum-tube method. During 1939, 401 reactors were disclosed, and in 1940 a total of 524 reactors, in a flock of approximately 3,000 birds. In May, 1941, the rapid whole-blood test was carried out on the young stock under six months old, so that this untested stock could pass at least one test before the official test for accreditation was carried out, and from a total of 1,196 birds, 29 gave positive reactions. At the same time the breeding stock of 219 birds was tested and two reactors were tested by the rapid whole-blood method, and at the same time samples were sent to the laboratory from each bird for the serum-tube test, when complete agreement was found between the two tests. At the same time the rapid test has been used to test young stock, not yet leg banded, before moving them from the rearing ground to the breeding farm. In this case the rapid test has been of undoubted value in the process of repeated testing, and has enabled us to obtain one complete negative serum-tube test of the whole flock, and, in all but three pens, two consecutive negative tests have been carried out.

In conclusion, we would like to summarise under headings the advantages and disadvantages of the rapid whole-blood test under field conditions, and its value in an eradication scheme for pullorum disease, bearing in mind that many of its advantages are increased under war-time conditions.

Advantages

1. The elimination of decomposed, or haemolysed samples caused by delays in transit, consequent upon possible disorganisation of postal or rail services.
2. Leg-banding is unnecessary—an important point in view of the present shortage of metal.
3. Reactors can be removed at the time of testing, so that fowls need be handled with only a minimum of interference with their normal productivity.
4. A consequent reduction in labour on the farm.
5. Elimination of samples containing insufficient serum, or of broken sample tubes.
6. A reduction in the amount of recording necessary, both on the farm and at the laboratory.
7. The presence of a qualified operator on the farm ensures that reactors are removed and the necessary control measures adhered to. He is also available for consultation on all disease problems and should be able to exert a beneficial effect on the general health of the flock. We have also found that this personal contact favours closer co-operation with the farmer, and with the owner who is sceptical of blood testing it is of great benefit to be able to demonstrate the reaction taking place.
8. We have found the rapid test of value in eradicating infection from heavily infected flocks by enabling repeated testing to be carried out at short intervals, also in the testing of young stock not yet leg banded, before they are transferred from their rearing quarters.

Disadvantages

1. It is definitely less accurate than the serum tube test.

2. It is more costly in that in a controlled eradication scheme it is essential that the testing be carried out by an official staff of qualified operators.

3. A disadvantage from the farmer's point of view is that when the official tester arrives on the premises the assistance of two or three poultry men is required to handle the birds with the result that the work of the farm may be held up until the test is completed. On the other hand, with the tube test, the farmer can arrange his testing to suit the work of the farm. He usually obtains a large consignment of sample tubes from the laboratory and returns them in small numbers at his convenience. As far as the actual taking of the blood sample is concerned, the rate for the rapid test, with the necessary crating, is no more rapid than for the tube test.

3. Unless carefully trained operators are employed there is the danger of certain infectious diseases being carried from farm to farm on the holding crates or on the operator's hands, feet, clothes, etc.

4. The accuracy of the test depends to a large extent on the careful preparation and standardisation of the antigen by qualified technicians (in properly equipped laboratories) and if uncontrolled production of the antigen by commercial firms is permitted, the results might well be disastrous to the poultry industry. We ourselves have encountered a number of large-scale outbreaks of pullorum disease following on the improper use of the rapid test and the retention of reactors in the breeding flock.

5. A further danger which might result from the unrestricted sale of a non-standardised product is the dissemination of infection by live or contaminated suspensions. We ourselves encountered an extensive outbreak of fowl typhoid where the origin of infection was shown to be stained antigen which was found to contain live *S. gallinarum* organisms.

Summary

1. Our experimental results showed a close agreement between the rapid whole-blood test and the serum tube test.

2. These results, together with our field experience, indicate that the rapid whole-blood test is of value in the eradication of pullorum disease, particularly in the preliminary elimination of carriers in heavily infected flocks.

3. The accuracy and value of the rapid test depends on the use of a carefully standardised antigen.

4. In a controlled eradication scheme the testing must be carried out by unbiased qualified operators.

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COLONIAL WELFARE

Addressing the first meeting of the Colonial Research Committee, which was held on Monday of last week at the Colonial Office, Lord Cranborne, Secretary of State for the Colonies, said that the committee would have two functions: to advise him and his successors in office on schemes for assistance from the £500,000 a year provided under the Colonial Development and Welfare Act for "research and inquiry," and to assist in a broad survey of the whole range of Colonial studies. Not only would the committee be concerned with fundamental research; its field would include all forms of inquiry with more immediately practical application—in fact, the ascertainment, collection, and assessment of all facts that might be of value to the Colonial Empire.

* * * * *

There are now 2,313 members of the British Goat Society, compared with 685 ten years ago. Milk production among registered goat herds is increasing, despite war-time feeding difficulties.

CLINICAL COMMUNICATION

Schistosomus Reflexus

C. C. RENWICK, M.R.C.V.S.,
Tarporley, Cheshire

The interesting communication of Dr. W. L. Williams in the issue of May 23rd, 1942, on the above subject has impelled me, somewhat reluctantly, to record the fact that, in my short experience, I have observed and relieved five cases of dystocia due to this monster—and this within twelve months. In view of this I did not consider this monster so much a rarity as a freakish trick of Nature periodically played on veterinary obstetricians to try their patience and powers of physical endurance.

I regret now that these specimens were not subjected to a more thorough examination, but, like Messrs. Smythe and Robertson, I was more concerned with the dystocias they caused.

The first three were encountered in Lanarkshire and the remaining two in the above district.

The following is a brief outline of these cases.

Case 1.—A cross-bred cow, third calf, 8½ months gone.

On examination the head, left fore and both hind legs were found presenting. All the joints were ankylosed and the hind legs were doubled over on the back due to the curvature of the spine. The awkward form of the foetus made embryotomy difficult but the fore leg was removed and then both hind and the pelvis. The costal arch, being everted, still made delivery impossible but with some manipulation and moderate traction the mass was removed. The right fore leg was deformed and lay out of reach between the everted ribs and short neck.

The cow, though exhausted, made an uneventful recovery.

Case 2.—Roan cross cow, third calf, six weeks premature.

The head, both fore and one hind leg were presenting. In this case it was possible to sever the spine. The fore end was delivered first, and then the hind end, which required a fair amount of traction. The cow did not look well, and next day slaughter was advised.

Case 3.—Ayrshire cow, fourth calf at full time.

The intestines were protruding from the vulva and on examination the diagnosis of *schistosomum reflexum* was confirmed. The presentation was a transverse fully grown foetus, the ventral aspect of the spinal column against the pelvis.

The viscera was removed and the spine severed in the lumbar region. This part was fixed by a hook and the hind quarters were removed. The everted ribs were now presenting. The fore legs and head were brought up and delivery was effected after a good deal of traction—the ribs causing the difficulty. This cow made a good recovery.

An embryotome would have saved a tremendous amount of energy in these cases, but unfortunately an embryotomy knife was the only instrument of value available. However, epidural anaesthesia made the operations possible.

Case 4.—A black cross cow, second calf about two months premature.

All four legs and the head were presenting, the fore quarters being on the floor of the pelvis. The pelvis was roomy and by careful manipulation of the distorted monster delivery was effected with little difficulty.

This specimen was alive and the heart was beating strongly against the diaphragm. The placenta was retained in this case and, unlike the placentae in the other cases, was quite healthy.

Case 5.—Roan cross cow, fourth calf, about two months premature.

The head and all four legs were presenting as in the previous case, but there was not enough room in the pelvis for delivery. One fore leg and the head and neck were removed. It was then possible to deliver the remainder of the monster.

This cow, also, made a good recovery.

These cases were recorded not so much on account of any fresh information they may contain, as humbly to support Dr. Williams' contention that these monsters are not as rare as appears to be generally believed. Two other monsters encountered this spring were a hydrocephalus, whose cranium was easily twelve inches in diameter, and a two-headed foetus with deformed hind legs.

Weekly Wisdom

"*In the course of a variety of experiments on animals and vegetables I have frequently observed that the results of experiments in the one have explained the economy of the other, and pointed some principle common to both.*"—John Hunter, 1728-1793.

THE VETERINARY RECORD

July 11th, 1942

SCIENCE AND WAR

WE reprint in full the following letter by Professor A. V. Hill, M.P., Secretary of the Royal Society, from *The Times* of July 1st last, to bring into proper relief the words which we have italicised. We cannot help but feel that although these words have a general application they also apply particularly to our own domestic organisation, *viz.*, that of the whole field of veterinary science, as directed now at home and in many territories overseas. We need not dwell at this stage on the appositeness of Professor Hill's criticism or on the lessons in disaster and tragedy which he believes subordination of scientific and technical control to so-called administration have taught us in the grim experience of war. Their full relevance must needs be meticulously assessed in the conspectus of articles which we hope to publish before long surveying the various aspects in development of the veterinary profession. It may be said, nevertheless, at once, that the perils which are run from the quenching of the genuine scientific urge by the hand of administration, born and nurtured in a "world" devoid of science, abound in times of peace no less than in war, but their dire effects are more prone to escape notice. By virtue of his having a mind uninhibited by the discipline of real experience in undertaking research and of having his wits commensurately sharpened by knowledge of men rather than by the true objective understanding of the problems they present, the "administrator" in a government service is at an advantage in comparison with the scientist. The dangers arising from this state of affairs are enhanced by the fact that the scientist in government service rarely has real executive power. Thwarted in his enterprises, and unable to find language which could impress this outlook upon an unscientific government, the scientist therefore, in the veterinary as well as in the other fields, has hitherto in the main been deprived of the facilities to make his full contribution to progress. All too often aberrant developments in most fields of enquiry have therefore taken place, developments sometimes without any scientific basis and other times based upon only a partial understanding of the scientific facts underlying them.

For these reasons we are glad to note that a deputation from the Parliamentary and Scientific Committee is to meet Mr. R. A. Butler, M.P., Chairman of the Scientific Advisory Committee to the War Cabinet, in order to urge upon the Government the necessity to co-ordinate scientific advice and to give scientists executive as well as advisory powers. We wish this deputation success.

It is to be hoped that the stark realities of war will have had the salutary effect of bringing home to the public the essential role of the scientist in the attainment of the ends most to be desired.

To the Editor of *The Times*

Sir,—The defeat in Libya is due largely to a single cause, the inferiority of our tanks to the enemy's.

This inferiority is due not to bad workmanship, but to a system which has failed to anticipate future tactical requirements in guns, projectiles, armour, and performance, failed to collect, analyse, and profit by previous operational experience, failed sometimes even to obey the elementary rule that production must follow, not precede, development. Too many disasters in the present war have been due either to technical mismanagement of this kind, together with unjustified optimism, or else to improper or inefficent use of available weapons, resources, or material.

It is not a question now of being wise after the event. *Those who have urged for years that our scientific and technical set-up was faulty at the top have hoped against hope that they were wrong: each disaster in turn has shown that they were right. Scientific and technical control is entirely departmental, not central, and usually at a low level, subordinate to administration.* For operations, planning has been centralised in the Chiefs of Staffs organisation; for supply, in the Minister of Production. The third member of the trinity, dealing with research, design, and development and quantitative planning of the use of technical resources, is altogether unrepresented at the highest level. There is no central technical staff or individual to advise the Cabinet, or the Chiefs of Staffs, directly on the scientific and engineering aspects either of operations or production, or to ensure, on their behalf, that design and development are efficient and far-seeing. All such functions are left to departments.

In the U.S.A. Secretary Stimson recently announced the formation of a Joint Committee on New Weapons and Equipment, to work with the American Chiefs of Staffs organisation. Its chairman, Dr. Bush, is one of the most eminent engineers and scientists in America: the two other members are technical officers of the Navy and Army. Its functions are to advise the Supreme Operational Command on technical engineering and scientific matters, and to guide research and development in the Navy, Army, and other departments to meet operational needs. A year earlier the Office for Scientific Research and Development was set up, also under Dr. Bush, and answerable directly to the President: its three sections organise research and development respectively in weapons, aircraft, and medicine. Such work goes on in departments as before, but these extra-departmental agencies at the highest level watch over the business as a whole.

What the Americans can do so early in their own war we ought to be able to do now: unless we do, we shall continue to fumble on from disaster to disaster.

Yours faithfully,

House of Commons. A. V. Hill.

June 28th.

ANIMAL PRODUCTION AND VETERINARY SCIENCE

A New Service of "Biological Abstracts"

To meet the requirements of those engaged in the animal industries, "Biological Abstracts" (University of Pennsylvania) announces the establishment of a new section, *Section F, Abstracts of Animal Production and Veterinary Science*, which began publication in January, 1942.

The biological research literature on the breeding, nutrition, husbandry, diseases and pests of the domesticated animals—including poultry, fur-bearing animals and pet stock—is scattered throughout a large number of original research journals in many languages, and its assembly, in the abstract issues and indexes of a single comprehensive abstracting journal should, it is felt, be a great convenience to all who are working in the broad field of animal production.

The new section will be published in ten abstract issues per year at an annual subscription rate of $5. Subscribers to Section F will also receive the index to the complete edition of *Biological Abstracts*.

Section F contains all of the abstracts published in *Biological Abstracts* that have to do with the breeding, nutrition and metabolism, husbandry, reproductive and other physiology, anatomy, pathology and parasitology, and arthropod pests of livestock, poultry, and semi-domesticated animals and birds, including pet stock.

Biological Abstracts now covers approximately 1,600 periodicals—thus the new abstracting section affords a very complete résumé of the biological literature pertaining to the animal industries.

Inquiries should be addressed to *Biological Abstracts*, University of Pennsylvania, Philadelphia, Pennsylvania, U.S.A.

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ROYAL ARMY VETERINARY CORPS

Mention in Dispatches

Announcement is made in the issue of *The London Gazette* of June 26th, that His Majesty has been graciously pleased to approve that Capt. (temp. Major) J. C. Rix (50456) be mentioned in recognition of gallant and distinguished services in the Middle East during the period July, 1941, to October, 1941.

. . . . .

The following announcement appears in the issue of *The London Gazette* dated June 23rd: "Maj. W. H. J. Kirk (16410) having attained the age limit, relinquishes his commission June 27th, 1942, and retains his rank."

* * * * *

Foot-and-mouth disease was confirmed on Saturday among pigs at Llanfair, Merioneth.

BIOGRAPHICAL ARTICLE

Professor A. W. Whitehouse

PRESIDENT OF THE ROYAL COLLEGE OF VETERINARY SURGEONS

It will be felt throughout the veterinary profession that in electing Principal Arthur Wildman Whitehouse to be President, the Royal College of Veterinary Surgeons has conferred its highest honour upon one of its most distinguished members. Entering the profession in this country much later than is usual, the future President was not long in making it evident that a new and colourful personality had come among us. That he will maintain the dignity of the Chair and Council, and guide the profession well cannot be doubted.

In narrating Principal Whitehouse's career it would be very easy to fill more space than is available, for he has travelled much and done many things. Never at least was his course humdrum.

His early education was at Winchester, then he went to Oriel College, Oxford. However, the love of horses and adventure was strong upon him, and so in 1887, without taking his degree, he forsook Oxford for America and ranching in Colorado. For nearly twenty years Whitehouse was a rancher, breeding horses and cattle. (He was neither Principal nor President then, and "Mr. Whitehouse" seems somehow inappropriate.) One of his activities was the crossing of thoroughbred stallions with native pony mares, to produce polo ponies, with what results the writer of these notes is unable to say.

During this time he married a New York lady, who in later years was regularly seen at the Congresses of the National Veterinary Medical Association.

In an interval, too, he attended the Ontario State Veterinary College at Toronto, where he qualified in 1894; and then went back to his ranch. Ten years later he gave up ranching and started veterinary practice at Laramie, Wyoming. Although this was in the main small town practice, it involved also long visits to ranches in the surrounding country, where the place names hauntingly recall one's youth and the novels of Zane Grey. A visit to a ranch usually meant one urgent case and an accumulation of work waiting on just such an occasion: castrations, filing and cutting of teeth, and all the odd jobs which the stock-owner's ingenuity can devise for getting the utmost possible out of a visit from his veterinary surgeon. Then came attendance for the final year's course at the State College of Colorado, and graduation there as D.V.S. Another spell of practice followed, but before very long Doctor Whitehouse was invited to return to the State College as teacher of anatomy, an invitation which he accepted. In his own words, he now "gave up the freedom of general practice and became a slave." However that may be, variety had not yet gone out of his life. Like other State agricultural colleges in the United States, the College of Colorado had a grant of land from the Federal Government, to be used partly for a scheme of infantry training. By chance or ingenuity some guns were obtained, official recognition secured, and as a result, when the war of 1914-1918 came, Doctor Whitehouse found himself a lieutenant of gunners in the United States Army! But the need for veterinary officers being greater than the need for gunners, he was induced to transfer to the Veterinary Corps. As a veterinary officer, then, he served with the American Army in France during the war.

When the war was over, Captain Whitehouse, as he now was, returned to his old college at Oxford, and, more than 30 years after he left it, took his B.A. in 1919, and his M.A. in 1922. In this latter year, also, under the post-war scheme approved by the R.C.V.S., he was able to take the final year at Liverpool Veterinary School, and qualified as M.R.C.V.S.

Almost immediately he was offered the post of Principal of Glasgow Veterinary College in succession to Professor Gaiger. That post he still holds. Of his work in Glasgow and in the affairs of the profession there is no need to write at length. General recognition of its worth is shown by his elevation to the Presidency.

The life of the new President has been an eventful one. He is that kind of man, living every moment of it with zest and enjoyment. His opinions are apt to be clearly cut and strongly held, expressed with incisiveness, but humorously, with the oddly engaging American idiom breaking in now and again.

The great tradition of the Presidential office has now been passed on to Principal Whitehouse. In his keeping it will lose nothing of honour and distinction. D. C.

LEGAL NOTES

Unlawful Use of Title.—At Bournemouth on June 23rd, John Mitchell Lewis, of Deepdene, Ringwood Road, West Howe, was fined a total of £20, with six guineas costs, for unlawfully using the title of veterinary surgeon, contrary to Section 17 of the Veterinary Surgeons' Act, 1881, and in view of the seriousness of the case the Bench fixed an alternative to immediate payment of fines and costs of one month's imprisonment on each of the two summonses, to run concurrently. Defendant was not present.

Mr. Marshall Harvey, instructed by the Royal College of Veterinary Surgeons, said defendant was not on the register. The two charges were founded upon applications which defendant made to the Petroleum Officer for the purpose of obtaining supplementary petrol. On these two forms in reply to "profession, occupation or any other business" he wrote "veterinary surgeon," and he stated that the purpose for which he required the supplementary petrol was for visiting surgeries at Winton, Bournemouth, Poole and Bear Wood, and visiting sick animals and owners at addresses in Hampshire and Dorset around Bournemouth. Mr. Harvey said a few days ago defendant wrote to the Registrar of the Royal College of Veterinary Surgeons. In one letter he said, "I was only a week ago given my commission as a Second-Lieut., and to say the least police court actions are not a social advantage." Defendant offered to sign an undertaking not to use the title of veterinary surgeon, and to insert an advertisement announcing the fact that he was not a member of the R.C.V.S., and place a notice permanently on his premises to the same effect. A reply was sent that the case would have to be proceeded with.

Mr. G. K. Fenn-Smith, M.R.C.V.S., of Winton, produced the register of the Royal College of Veterinary Surgeons and said defendant's name was not on it. Mr. George Sell, Assistant Divisional Petroleum Officer, Southern Division, produced defendant's application forms and said he was granted supplementary petrol as being a veterinary surgeon. Two chemists also gave evidence, the former stating that defendant signed the poison book as "veterinary surgeon" and the latter that defendant signed himself as "animal doctor."

Royal College of Veterinary Surgeons

Annual General Meeting

The ninety-ninth Annual General Meeting of the Members of the Royal College of Veterinary Surgeons was held at the Royal Station Hotel, York, on Wednesday, June 3rd, 1942.

There were present: Mr. John Holroyd (President) in the Chair, Messrs. H. W. Dawes, C. Harvey, G. H. Livesey, J. W. McIntosh, T. M. Mitchell, Col. W. S. Mulvey, W. Nairn, Sir Arthur Olver, J. O. Powley, J. W. Procter, H. W. Steele-Bodger, G. K. Sutherland, Lt.-Col. R. H. Stalker, E. Varley, Dr. A. W. Whitehouse, T. Wilson and Dr. W. R. Wooldridge.

The Secretary read the notice of meeting at it appeared in *The London Gazette* of May 8th, 1942.

The minutes of the previous Annual General Meeting were read and signed as correct.

Letters of apology for absence were received from nine members of the Royal College.

Irish Representative.—The Secretary read the report of the Returning Officer for Eire, announcing the re-election of Mr. A. A. Donnelly as a general elected member to hold office for a further period of four years.

ANNUAL REPORT

The Annual Report and Statement of Accounts for the year ended March 31st, 1942, were presented and considered page by page.

The PRESIDENT: On page 4 you will notice that the peak number of candidates examined by the College was in 1939, and that the number is now falling.

Dr. WOOLDRIDGE: What was the total number of members on the Register?

The SECRETARY: The Register for 1942 contains the names of 4,983 members.

Dr. WOOLDRIDGE: On the report about the Library, I have been asked by one or two members to raise the question of the advisability of the closure of the Library. They wished me to express their very strong regret that the Library was closed. They think it is quite wrong for this College to discontinue that service, which was a unique one, and they would like to see the Library reorganised in the near future. One of the reasons is that various libraries which were bombed out are finding it advisable to reopen now from the point of view of securing the books that have been lost. That is an additional argument why the service which has been discontinued and which was an invaluable one should be restarted.

The PRESIDENT: I think that the proper thing for me to say is that the Council will take note of what you have said.

Mr. STEELE-BODGER: I notice in the paragraph about the draft Amendment Bill it says that when the draft is approved it will be circulated to the profession. I understand that means that it will be submitted to the profession for their approval?

The PRESIDENT: Yes, that is so. I have been surprised to learn that a number of members in various parts of the country have thought fit to criticise the action of the Council in preparing a Bill to amend the Veterinary Surgeons Acts without first ascertaining the views of the profession. I should therefore like to take this opportunity of reiterating the various stages which have been taken up to the present. At the Council meeting in April, 1940, the Council adopted, on the recommendations of a Joint Committee consisting of representatives of the R.C.V.S. and N.V.M.A., the following resolution:—

"That it is desirable that a Bill should be prepared to amend the Veterinary Surgeons Acts to provide for the prohibition of practice by unregistered persons."

At the Annual General Meeting held on June 4th, 1940, one of the items on the Agenda was the following:—

"To consider, and if so decided, to pass the following motion: That the Council be authorised to prepare a Bill for the amendment of the Veterinary Surgeons Acts."

This motion was unanimously passed and since that date the Council has been engaged on the drafting of a suitable amendment Bill. Such a task requires extreme care and prolonged discussions.

In the Annual Report issued to every member of the profession last year the following paragraph appeared:—

"A special Committee has been engaged during the year in considering the preparation of a Bill to amend the Veterinary Surgeons Acts to provide for the prohibition of veterinary practice by unregistered persons. Such a measure would involve the placing on a separate list the names of unqualified men who could produce satisfactory evidence that they are and have been for a stipulated period engaged in giving medical and surgical treatment to animals as their principal means of livelihood. This is in accordance with precedent. The draft Bill, as prepared by the Special Committee, is under consideration by the Council."

The Annual Report, including this paragraph, was unanimously passed by the General Meeting held here on June 20th last year.

There is no doubt therefore that the Council has received the full authority of the profession to go on with the preparation of such a measure. Moreover, it was clearly pointed out to members, as appears from the report of the meeting published in *The Veterinary Record*, that the Bill would be submitted to the whole profession for their approval before it would be presented to Parliament.

As you see in the present Report, a similar statement is made regarding the draft Bill; progress is being made, but the final draft is not yet ready for receiving the approval of Council.

I can assure you, gentlemen, and all members of the profession, that when the Council are satisfied that they have produced a Bill which properly safeguards the interests of the profession and of the public, they will circulate it to all members of the profession with an explanatory memorandum. Ample time will be given for discussion, and I am confident the Council will give due consideration to any observations members care to make. In the meantime, I would ask members to give the Council the credit of having the best interests of the profession at heart. (Hear, hear.)

Are there any further observations on the Report? If not, I put it to you that the Report of the Council and the Financial Statement be adopted.

Mr. LIVESEY seconded, and the motion was carried unanimously.

Mr. DAWES: I have much pleasure in rising to propose a hearty vote of thanks to our President, Mr. John Holroyd, for his conduct in the Chair, not only to-day, but also during his year of office. Our President has guided the fortunes of this College through an extremely difficult and trying period. Many of us round this table know very well the difficulties that have arisen during the past twelve months. Mr. Holroyd has sacrificed his time and energies in order to carry through the work to a successful conclusion. I need hardly say that those in the North of England who knew him, had no doubt of his ability, but we all of us have seen how successfully he has filled the Presidential Chair and how he has emulated those distinguished men who have occupied the Chair before him. I have very great pleasure in proposing a hearty vote of thanks to him.

Mr. MCINTOSH: May I be allowed, as one of the oldest members of the Council, to associate myself with all that has been said by Mr. Dawes. It has been my privilege and honour to serve under a good many Presidents during my term of office, and I have never served under one who has given greater satisfaction to members of the Council and the profession than Mr. Holroyd. I should like to associate myself in the fullest measure with the motion that a hearty vote of thanks be accorded to our President.

The motion was carried with acclamation.

Mr. HOLROYD returned thanks for the tribute and, there being no further business, then declared the meeting closed.

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Meeting of Council

Election of Dr. A. W. Whitehouse as President

A Meeting of Council of the Royal College of Veterinary Surgeons was held at the Royal Station Hotel, York, on Wednesday, June 3rd, 1942, when there were present Mr. John Holroyd (President) in the Chair, Messrs. H. W. Dawes, G. H. Livesey, J. W. McIntosh, T. M. Mitchell, W. Nairn, Col. Sir Arthur Olver, Messrs. J. W. Procter, T. Wilson and Dr. W. R. Wooldridge.

The minutes of the previous meeting of Council having been printed and circulated, were taken as read and signed as correct.

The receipt of letters of apology for absence from eleven members of Council having been announced, the Secretary reported that as the result of a slight accident on the previous day, Dr. Whitehouse, who had made an effort to attend the Annual General Meeting, was now too indisposed to be able to be present at the Council Meeting.

ELECTION OF PRESIDENT

The Secretary submitted the report of the Selection Committee, which was to the effect that they nominated Dr. A. W. Whitehouse, M.A., M.R.C.V.S., as President of the College for the ensuing year.

As there were no other nominations, the PRESIDENT moved from the Chair that Dr. Whitehouse be elected President of the College for the ensuing year.

The motion was seconded by Mr. MCINTOSH and supported by Col. MULVEY, and it was declared carried unanimously.

Mr. HOLROYD: I am sure it will be your wish, gentlemen, that we should send immediately from this Council our very best wishes

to Dr. Whitehouse, and that our Secretary should at once communicate this news to him in his room; also that he should at the same time express to him the sympathy of all of us in his present indisposition and our hopes that he will soon be restored to his normal health. I move that Dr. Bullock immediately goes to Dr. Whitehouse and gives him this message of sympathy and congratulation.

The SECRETARY carried this message to Dr. Whitehouse, and on his return said:

Dr. Whitehouse received the message I gave him with great pleasure, and asked me to convey to you gentlemen his great appreciation of the honour you have done him, but at the same time his deepest regret that he should be deprived by this accident from being with you in person. He feels this especially because he wanted to express to Mr. Holroyd, what would have been his duty, how greatly indebted he feels the Council and the profession are to Mr. Holroyd for the manner in which he has conducted the business of the College during the past two years.

It was resolved: "That in the absence of the President, Mr. Holroyd should continue as Chairman of the meeting."

ELECTION OF OTHER OFFICERS

Vice-Presidents.—Mr. NAIRN: I formally propose that Mr. J. Holroyd be elected Senior Vice-President of the College for the ensuing year. This motion was seconded by Col. MULVEY, supported by Mr. DAWES, and carried unanimously.

Mr. MCINTOSH then moved that Mr. W. Nairn be elected second Vice-President of the College for the ensuing year.

Mr. J. W. PROCTER seconded, and the motion was carried unanimously.

Mr. LIVESEY: In the absence of Dr. Whitehouse, I am sure that it is the wish of the Council that we should express to you, Sir, our most heartfelt thanks for what you have done during the past two years you have occupied the Presidential Chair. You have suffered under great trials owing to the war, and we know, too, the difficulty in the matter of health from which you have suffered and the patient way in which you have endured them. We appreciate also the help that has been given to you by Mrs. Holroyd, and we thank you both.

Dr. WOOLDRIDGE: As one of the junior members of the Council, I should also like to second that motion, particularly as I am sure that I, along with some of my colleagues, may have caused you considerable trouble at times. In seconding the motion, I would like to express our appreciation of your patience with us, and an acknowledgement that we have derived great benefit from your advice.

The motion was carried with acclamation.

Mr. HOLROYD: Mr. Livesey, Dr. Wooldridge and Gentlemen, I hardly know how to express my thanks for the very kind words you have said. I can assure you that the two years of office have not been without trials to me. Anyhow, I feel that if I have given you satisfaction that is all I have desired, for I have only tried to do my best in the interests of this Council.

Treasurer.—Mr. NAIRN: I beg to move the re-election of Mr. J. W. McIntosh as Treasurer of this College for the ensuing year. He has done his work faithfully and zealously and we hope he will long continue to do so.

The motion was seconded by several members, and was carried with acclamation.

Mr. MCINTOSH: Thank you very much, gentlemen. I shall do my best as in the past.

Secretary and Registrar.—Mr. HOLROYD: It generally falls to the President to move this motion. In the absence of the President, I think I ought to take on the duty, and I have very much pleasure in proposing to you that Dr. Bullock be reappointed our Secretary and Registrar. Those of us who have occupied the Presidential Chair know the invaluable assistance of Dr. Bullock, and I am sure there will be no other nominee.

The motion was carried unanimously.

Dr. BULLOCK: Thank you, Gentlemen.

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whom were very strong supporters of the Benevolent Fund. These gentlemen were well known to all of you, and we have sustained a very serious loss in their passing. I move from the Chair that our sympathy be conveyed to the respective families. This motion was carried by all the members standing in silence.

This concluded the business, and on the motion of Mr. HOLROYD a hearty vote of thanks was accorded to Mr. McIntosh for his conduct of the meeting.

Victoria Veterinary Benevolent Fund

Annual General Meeting

The twenty-fourth Annual General Meeting of the Members of the Victoria Veterinary Benevolent Fund was held at the Royal Station Hotel, York, on Wednesday, June 3rd, 1942, when there were present Messrs. H. W. Dawes, C. Harvey, John Holroyd, G. H. Livesey, J. W. McIntosh, T. M. Mitchell, Col. W. S. Mulvey, W. Nairn, Sir Arthur Olver, J. O. Powley, J. W. Procter, H. W. Steele-Bodger, Lt.-Col. R. H. Stalker, G. K. Sutherland, T. Wilson and Dr. W. R. Wooldridge.

In the absence of the President, Mr. J. W. McIntosh was voted to the chair.

The minutes of the previous Annual General Meeting having been published, were taken as read and signed as correct.

Letters of apology for absence were received from the President, Lt.-Col. Brittlebank, Prof. Buxton (Vice-President), Mr. G. P. Male (Vice-President), Lt.-Col. P. J. Simpson (Hon. Secretary), Mr. A. Spicer (Hon. Treasurer), and five other members.

ELECTION OF OFFICERS

It was resolved "That the officers of the Fund be re-elected *en bloc*." The list is as follows:—

President: Lt.-Col. J. W. Brittlebank.
Vice-Presidents: Prof. J. B. Buxton, Mr. G. P. Male, Capt. J. R. Rider, Prof. G. H. Wooldridge.
Hon. Treasurer: Mr. A. Spicer.
Hon. Secretary: Lt.-Col. P. J. Simpson.
Auditors: Messrs. Wilkinson, Chater & Co.

Mr. DAWES: I should like to take the opportunity of saying how very sorry we are to hear of the illness of our Hon. Secretary, Col. Simpson. I suggest that on behalf of the members present we should send a letter to Col. Simpson expressing our sympathy with him and conveying the wish of all of us that he may soon be restored to health.

Mr. MITCHELL: I second that, and I should like to add the name of Mr. J. R. Rider, one of our Vice-Presidents. He has been ill for a long time, and I think we should express to him our sincere wishes that he may soon be restored to health.

Mr. MCINTOSH: I am sure we all agree with the sentiments expressed by Mr. Dawes and Mr. Mitchell, and the letters shall certainly be sent.

ANNUAL REPORT

The Annual Report and Statement of Accounts were then considered. In proposing their adoption, the CHAIRMAN addressed the meeting as follows:—

May I say a word about the Fund, though I know it is hardly necessary in this company, for you are all aware of the work done by the Victoria Veterinary Benevolent Fund. I, personally, think it is regrettable that out of the total membership of the College we have only 435 who subscribe to this Fund. That, to my mind, is a reflection on our profession. As you can see from the list, a large number of persons are receiving grants, and many of these are of very small sums. The Council would like to be able to assist to a fuller extent than they are doing in many cases. I would like everyone here to use whatever influence he has to bring in new members. We were greatly helped last year by the efforts of the late President of the N.V.M.A., Mr. Steele-Bodger, and we owe him a debt of gratitude for all he has done. We should also record our thanks to the Ladies' Guild and to the Northern Ladies' Committee who have in very difficult times done all they could to forward the work of this Fund. But I feel sure we could easily double or treble the number of subscribers, which would in itself be a very great help towards the provision of what is very much needed—extra funds.

If there are no observations to make on the Annual Report and Statement of Accounts, I propose their reception and adoption.

Mr. HOLROYD seconded, and the motion was carried unanimously.

Election of Council.—The Secretary reported that of the ten members appointed to represent the members of the Fund on the Council, two had died during the year, namely, Mr. F. L. Gooch and Mr. W. Woods. It was resolved to add the names of Mr. J. O. Powley and Dr. W. R. Wooldridge, and to reappoint the other eight members.

Mr. MCINTOSH: I think it is only right and proper that this meeting should express its deep sense of the loss which the Fund has sustained by the death of Mr. Gooch and Mr. Woods, both of

(Concluded in previous column)

IN PARLIAMENT

The Nation's Health: "Tuberculosis Increase a Cause of Concern"

In the course of his speech introducing the Health Estimates to the House on July 1st, Mr. Ernest Bevin, the Minister, said that one problem that was causing him some concern was tuberculosis. The number of deaths from that disease was 28,669 in 1941, compared with 28,144 in 1940, 26,176 in 1938, and 53,858 in 1916. The steady fall in tuberculosis which had been a feature of the 25 years of peace had been interrupted in the last two years. There were conditions in war-time which predisposed to tuberculosis, such as the black-out, overcrowding, and the cessation of house-building. Looking at the problem as a whole, his view was that they needed to review their general approach to it and to give greater practical effect to the need for early diagnosis. In the past they had tended to concentrate on treatment rather than on early diagnosis, but the developments in miniature radiography during the last few months seemed to give us a new and useful weapon as a means of detecting those persons where more detailed examination should be undertaken. The fullest possible advantage should be taken of the development now available for that purpose. He had ordered a number of sets of equipment through the Ministry of Supply both from America and from makers in this country. There was now the possibility of getting British machines. When the machines were secured, he would make them available for use by local authorities as a part of their tuberculosis scheme. Steps were being taken to see that trained teams were available for handling the machines, and he hoped that toward the end of the year they would be able to begin to use them on a carefully planned basis. In that way he hoped they would be able to detect and treat tuberculosis at an early stage, when they could, by a period of suitable treatment, restore a man or woman to health and self-sufficiency with the shortest possible interruption of their normal life.

Secondly, they must give greater attention to after-care problems. The problem of caring for, rehabilitating, and securing the gradual return to suitable and productive employment ought to be tackled on more comprehensive lines. They would do all they could in war conditions to make sure that the milk supply was as clean and pure as they had power to make it. In order to provide adequately for the treatment of tuberculosis they must have the necessary number of beds in hospitals and sanatoria, and must have the necessary medical, nursing and domestic staffs for those beds. Although they made some call at the beginning of the war on accommodation used for tuberculosis to meet the anticipated needs for casualties, the present difficulty in increasing the provision for tuberculosis was not in making beds available but in finding nursing and domestic staff. No one wanted to use compulsion in the case of such staffs. They had to secure the necessary staff by propaganda and persuasion and through the good will of the professional organisations, which had been readily given.

In debate, Dr. Edith Summerskill stressed the fact that many children suffer from non-pulmonary tuberculosis: the previous week the Minister had told her that the number was 13,000. She thought that, on a conservative estimate, 40 per cent. of the cases of non-pulmonary tuberculosis were due to infected milk, *i.e.*, tuberculosis of bovine origin. The question of tubercle-infected milk, and of children suffering as a result, would never be reported in the newspapers. There was probably not one paper which would have the courage to talk about the non-pulmonary tuberculosis with which the children were suffering, because of the strong vested interests in milk in this country. If they were to prevent disease, the Minister must be bold. He must disregard those interests, and realise that his job was to improve the public health of the country. She, like many others, was growing impatient at the delay in issuing the report of the Committee which had been set up to inquire into the growth of tuberculosis.

Mr. Lipson said that it had been apparent from the speeches made that day that if, even during the war, the Minister of Health were to take up a much more offensive attitude towards health problems and, not being content merely because the war was on to carry on with things as they were, if he would be much more positive in his action, he would receive considerable support from all sides of the House. The request had been made that the Minister should spend much more money on research and other means of preventing disease, and this ought to be an encouragement to the Minister which he hoped the Minister would accept as such.

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Questions

Milk Production (Inspection)

Mr. David Adams asked the Minister of Agriculture whether all farms and cows producing milk are subject to regular veterinary inspection; and when it is expected that all such milk will be of a standard safe for human consumption?

The Joint Parliamentary Secretary to the Ministry of Agriculture (Mr. Tom Williams): The majority of dairy cows are subject to regular veterinary inspection, but such inspection is not yet universal. As to the second part of the Question, the policy of the Government is to bring about this desirable result as soon as practicable.

Mr. Adams: Are we to presume that this is the continual policy of the Government, and, if so, why do they still allow hundreds of farms to produce milk that is unfit for human consumption?

Mr. Williams: I can assure my hon. Friend that whatever may have been the position in the past it is the active policy of the Government at the moment.

Dr. Edith Summerskill: Could my right hon. Friend say how he proposes to protect the public against infection from milk which is taken from farms where there is no inspection?

No answer was given.

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Farm Institutes

Mr. Harvey asked the Minister of Agriculture whether he is making preparations for the reopening of farm institutes for agricultural education; and whether, in this case, it is proposed that the education in the farm institutes shall be administered by the county councils as being the existing statutory authorities?

The Minister of Agriculture (Mr. R. S. Hudson): The answer to the first part of the Question is in the negative. The second part, therefore, does not arise.

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Allotments (Damage by Animals)

Mr. Donald Scott asked the Minister of Agriculture whether, in view of the damage done to allotments by the trespass of animals, he will consider extending Defence Regulation 62AA to include horses, cattle and sheep?

Mr. Hudson: No, Sir. The question of straying dogs on allotments, which is dealt with by Defence Regulation 62AA is not entirely analogous to trespass of horses, cattle and sheep. The existing remedies under Common Law are available, and I propose to make an Order under Defence Regulation 55 dealing specifically with straying livestock in certain specified areas where they are causing serious damage to crops on allotments and elsewhere.

Mr. Scott: Is the Minister aware that his reply will give great satisfaction to allotment holders?

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Poultry Rationing

Lieutenant Butcher asked the Minister of Agriculture why the announcement of the reduction in the poultry was not made earlier so as to avoid hardship and loss to many persons who have recently purchased chickens to rear for egg production?

Mr. Hudson: I assume that the hon. and gallant Member is referring to the new basis for the rationing of domestic poultry, which will not be introduced until October 1st. Domestic poultry keepers will continue to draw rations on the present basis until that date. There was no avoidable delay in the issue of the announcement after the necessity for the change, which arises in turn from a deterioration in the feeding-stuffs supply situation, had become evident.

Mr. De la Bere: Is it not very desirable that this scheme should be abandoned altogether, in view of the unnecessary hardship which will be caused to many hundreds of thousands of backyard poultry keepers?

Captain Godfrey Nicholson: Will the Minister take steps to secure publicity as to the value of other forms of food, such as acorns and beechmast?

Lieutenant Butcher asked the Minister of Agriculture the total amount spent in Press advertising and in other ways to encourage backyard poultry keeping; and the date on which the last advertisement appeared?

Mr. Hudson: The policy of the Government has been to assist through the Domestic Poultry Keepers' Council people who keep backyard poultry to get the best out of them rather than to encourage a wide extension of the movement. Advertisement of the kind indicated by the hon. and gallant Member has therefore not been undertaken.

Sir (Michael) Hugh Shaw Stewart, Bart., of Greenock and Ardgowan, who died at the end of last month, took a particularly keen and active interest in Scottish agriculture. His herd of Ayrshire dairy cattle at Ardgowan was one of the first to be tuberculin-tested in Scotland, and an Ardgowan-bred cow held the world's record yield for the Ayrshire beeed for some time. He was the first chairman of Glasgow Veterinary College after its incorporation in 1909.

NOTES AND NEWS

The Editor will be glad to receive items of professional interest for inclusion in these columns.

Diary of Events

July 17th.—Meeting of the Mid-West Division, N.V.M.A., at Bristol, 2.15 p.m.

July 23rd.—Summer Meeting of the South-Eastern Division, N.V.M.A., at Tunbridge Wells, 2.30 p.m.

July 24th.—Meeting of the Yorkshire Division, N.V.M.A., at York, 3 p.m.

July 31st.—N.V.M.A. Council and Committee Meetings at the Royal (Dick) Veterinary College, Edinburgh.

Sept. 20th.—Entries for Miss Alcen Cust Veterinary Research Scholarship (R.C.V.S.).

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N.V.M.A. COUNCIL MEETING IN SCOTLAND

As will be seen from the Diary of Events above, the next meeting of Council, N.V.M.A., will be held on Friday, July 31st, at the Royal (Dick) Veterinary College, Edinburgh, when it is hoped that members of Council will make every effort to be present.

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Scheme for the Control of the Major Diseases of Dairy Cattle

A Promising Start

In view of the fact that Form C.S.1 was not available to veterinary practitioners during the month of June, the figures given below indicate that the scheme for the control of certain diseases of dairy stock has made a promising start.

Scheme for the Control of Diseases of Dairy Cattle

Statement showing the number of Undertakings notified to the Ministry of Agriculture during the month of June, 1942

County	Undertakings notified during month		
	No.	No. of cattle	
		Cows	Heifers
England			
Bedford ..	3	100	55
Berks	13	244	150
Bucks	7	266	233
Chester	55	1,973	700
Cumberland ..	4	156	115
Derby	14	534	301
Devon	22	359	270
Dorset	1	29	6
Durham ..	32	857	172
Essex	15	411	216
Gloucester ..	10	286	225
Hampshire ..	53	1,684	1,154
Hereford ..	9	132	52
Hertford ..	7	319	210
Isle of Wight ..	2	24	5
Kent	23	533	343
Lancs	17	453	219
Leics.	5	119	57
Lincs (Holland)	2	26	1
„ (Lindsay)	2	57	1
Norfolk ..	15	405	256
Northants ..	12	384	306
Northumberland	11	262	64
Notts	3	55	57
Oxford	9	234	193
Rutland ..	4	80	56
Salop	23	957	302
England (*contd.*)			
Somersetshire ..	18	445	176
Staffs	30	917	326
Suffolk, E. ..	2	29	14
„ W. ..	4	47	44
Surrey	13	382	156
Sussex, E. ..	24	566	314
„ W. ..	11	323	293
Warwick ..	11	280	186
Wiltshire ..	12	540	187
Worcester ..	37	986	422
Yorkshire, N.R.	8	197	145
„ W.R.	20	588	170
Wales			
Anglesey ..	1	80	20
Brecon	2	25	19
Caernarvon ..	19	426	234
Cardigan ..	5	80	66
Carmarthen ..	52	1,123	640
Denbighshire ..	11	207	96
Flint	11	257	148
Glamorgan ..	14	183	86
Merioneth ..	2	23	23
Monmouth ..	4	9	34
Pembroke ..	21	523	277
Total ..	705	19,175	9,795

Note.—Of the 705 undertakings notified during June 234 are for 1 year, 42 are for 2 years, and 429 are for 3 years.

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Farm Livestock Emergency Service

At a meeting of the Executive Committee of the above service, held at 36, Gordon Square, on June 24th, Dr. W. R. Wooldridge, Director of Veterinary Services of the Urban Animals Service, was appointed Executive Officer for England and Wales and Dr. Alex. Robertson, of the Royal (Dick) Veterinary College, Edinburgh, Executive Officer for Scotland.

Death of Sir Daniel Hall

We record with deep regret the death of Sir Daniel Hall, K.C.B., D.SC., F.R.S., formerly Chief Scientific Adviser to the Ministry of Agriculture and Fisheries, which took place on Sunday last It is hoped to publish a notice in an early issue.

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HOME GUARD MOUNTED PATROLS: VETERINARY SERVICES

The Association is informed by the Director-General, Home Guard, that no provision can be made from public funds for the payment of fees or travelling expenses to members of the profession for services in connection with horses of Home Guard Mounted Patrols. The response to the enquiry addressed to the Director-General on this matter continues: "You will appreciate that these horses are not necessarily used for Home Guard duties only. An allowance towards the cost of maintenance is paid to the owners of horses employed in such patrols, but it is considered that any expense of the nature referred to in your letter must be regarded as the responsibility of the owners."

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PERSONAL

Birth.—Barber-Lomax.—On July 2nd, 1942, at Ravenhurst, Heaton, Bolton, to Patricia Frances (*née* Lowry), wife of John W. Barber-Lomax, M.A., M.R.C.V.S., B.V.SC., a son.

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Presentation.—Mr. Wm. M'Pherson, M.R.C.V.S., Culairain, Gartly, was presented at Huntly with an illuminated address and monetary gift on his retirement from professional work in the district extending over about half a century, in recognition of his valued services to the community.

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SCIENCE AND WAR

As was to be anticipated, the letter by Professor A. V. Hill on the above subject, which was published in *The Times* of June 29th and is reproduced with an editorial introduction elsewhere in this issue of the *Record*, has evoked a large volume of further valuable correspondence. Worthy of special note is a letter, dated July 1st, from Capt. Leonard F. Plugge, M.P., who writes: "As Chairman of the Parliamentary and Scientific Committee I would like to endorse the important suggestion put forward by Professor A. V. Hill, M.P., for the early establishment of some form of central technical and scientific general staff to advise the Cabinet and Chiefs of Staff direct and regularly. Professor Hill explained the new U.S.A. system in some detail yesterday to our committee when arrangements were made for a deputation headed by Lord Samuel (our President) to discuss this vital matter at the earliest opportunity with Mr. R. A. Butler, M.P., who recently took over Lord Hankey's chairmanship of the Scientific Advisory Committee.

"There is widespread agreement among the representatives of technical bodies affiliated to this committee that Sir Henry Tizard's demand at one of our recent discussions for the better strategic use of our technicians is one that calls urgently for recognition at the very top if we are to avoid the disasters that must inevitably follow from lack of any intelligent central direction or utilisation of the formidable scientific and technical resources we possess."

Such important papers as *The Sunday Times* are making enlightened comment upon the situation, clearly indicating that the public is becoming more appreciative of the necessity for securing the full benefit of scientific knowledge in the direction of the war effort.

Our readers will be glad to know that Dr. W. R. Wooldridge, President, N.V.M.A., is to be a member of the deputation to which reference is made above.

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Erratum.—In the paragraph describing sulphaguanidine results in the treatment of necrotic enteritis of swine, appearing in Dr. Slavin's contribution (p. 238) to the discussion on Mr. Powley's paper on the diseases of pigs, the statement "three treated and one untreated pigs died" should read "one treated and three untreated pigs died."

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THE DOMESTIC POULTRY RATION CUT

In a recent statement relative to the above, Mr. Tom Williams, M.P., said it was undoubtedly very hard for the backyarder to have

to reduce his flock. There was, however, no escaping the fact that the feeding-stuffs position had deteriorated seriously and a reduction of rations for domestic poultry-keepers and for commercial keepers became inevitable. The raising of the wheat extraction figure to 85 per cent. meant a loss of several hundred thousand tons of feeding-stuffs. The shipping position was extremely serious. On the one hand were losses from enemy submarine activity and on the other more ships were needed for troops and munitions.

The commercial poultry-keepers had already been cut severely and were to be cut again. It was impossible to leave domestic poultry-keepers untouched. There were already critics who said that domestic poultry-keepers were receiving preferential treatment. That would certainly have been the case if they had not suffered a reduction in rations this time. With the greatest reluctance, therefore, the decision had to be made to limit the number of birds for which backyarders could obtain balancer meal. No one could be more sorry than the Parliamentary Secretary, but total war extended even to the hen-house.

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WANTED A TUBERCULOSIS POLICY*

Although this leading article from *The Lancet* is concerned entirely with the formulation of policy for the control of human tuberculosis—a policy which must needs be very different in its outlay from one for the proper control of bovine tuberculosis—the text contains a close analysis of facts which cannot but be of significance and interest to the veterinary worker. Moreover, much urgency is added by the recent disclosure of the Minister of Health, in the Commons, that an increase in tuberculosis amongst the human population is causing our Public Health Authorities grave concern (see Parliamentary Column).

Many medical problems must be left for a decision until the end of the war; either the material facts are not now available or they must be used in the light of post-war conditions which we can hardly even guess at. But tuberculosis is an exception. We know more about it than we do about any three or four other diseases. If we fail to act it is not our knowledge but our application of it that is at fault. Nor can the solution be left for a year or two with impunity. The pains which our official mentors are at to explain away the Registrar-General's figures reveal rather than conceal their anxiety that tubercle will get away with it in this war as it has done in every other. The first thing is to be frank about the danger. The public will only agree to pay for, accept and submit to a policy which they feel is an investment against their own conception of the fearsomeness of a particular disease. They have been taught that tuberculosis is preventable, that its early detection is simple, that treatment instituted in good time leads to arrest and recovery, that sanatorium treatment is available for all who may be unfortunate enough to become affected, and that a stay of a few months in delightful country surroundings will ensure an early return to home and duty. There is scarcely one of these teachings true in the strict sense: for it is impossible to prevent infection in the community as a whole (it has been argued, in fact, that minor degrees of infection may actually be beneficial); the early detection of the disease is one of the most formidable problems confronting doctors; treatment cannot be instituted in good time for the great majority of cases because the lesions are relatively advanced when they are first detected; and if we could detect all cases there would be a lamentable shortage of beds for their treatment, assuming they would enter institutions at all. The slogan of 1911 that three months in the open air was the passport to pulmonary security is a will-o'-the-wisp.

This may sound to some like dialectic, an unsympathetic thought-process reflecting too hastily the underlying world-process. It needs to be said, but it should not lead to despair or inertia. The results so far achieved may not have been commensurate with the "new hope" which Trudeau proclaimed at the beginning of the century, but no-one can walk around colonies like Saranac or Papworth without becoming aware that infection with the tubercle bacillus in a good environment is not necessarily prejudicial to health. Here is the ideal conception, the very paradigm, of the problem of seed and soil. Here are object lessons in combining all the beneficial factors in infection and environment. Apply these principles by and large and the problem is solved. Of course these institutions cannot be multiplied indefinitely, but the lessons they teach are capable of much wider application than they have hitherto received. Let us turn for a moment to some recent epidemiological surveys and consider in broad terms what has come out of them. Bushnell, Cummins and others, attempting to explain the incidence of the disease is different countries, have shown that where tuberculosis is common, as in England, the disease assumes the chronic and relatively benign type; where, on the other hand, the disease is rare the cases that do occur are as a rule rapidly fatal. Certain individuals and communities are much more resistant to tuberculosis than others of the same race. Bradbury (Lancs) and Edwards (New York) have taken special districts and tried to determine the responsibility for the higher attack-rate in certain groups of the population, but they have found it impossible to isolate the various factors included under the term "environment" and to allocate to each factor its proper rôle in the spread of the disease. Some would even dispute Bradbury's conclusion that the Irish of Tyneside are a specially susceptible group. It is true that certain towns like Manchester, Liverpool and Cardiff, which have had a consistently high tuberculosis mortality-rate, have large congregations of Irish in their populations; but, as Picken has pointed out, Glasgow seems to provide an exception to the rule. In a third type of survey a selected group of the population has been investigated, as at Saranac Lake, in some of the Welsh inquiries, and at Preston Hall in Kent. To these belongs Bardswell's discovery that in Cyprus, where poverty, bad housing, overcrowding, malnutrition and other bad environmental factors coexist, tuberculosis need not assume serious proportions so long as massive infection is controlled. Per contra experience at Saranac and Preston Hall shows that in communities where large numbers of open cases are congregated but where there is no poverty, no bad housing, no overcrowding, no malnutrition—but where close watch is kept on families as a whole—healthy individuals nearly all escape.

The lesson is this. Infection and environment must be considered together and not separately as we have been wont to do. Infection is itself an environmental factor. Germs may lurk in dark damp places, but the darkest and dampest is the cavity in the lung which remains uncontrolled or uncollapsed, and all the public-health measures in the world will not sanitate these the most important source of infection. Infection being present, other environmental factors must be brought up to a specified standard if massive infection is to be avoided. In our own world at the moment tuberculosis must be prevented, not by entire elimination of the infecting agent, but by reducing its degree of infectivity. We know what the tubercle bacillus does in the unfavourable environmental conditions of Wales and among the homeless and non-settled males of New York City. Let our own public-health service set itself to search out the sources of infection, many of them completely unknown, and eradicate them, not waiting for the interplay of other environmental factors which sooner or later will lead to the spread of disease. This is what Professor E. S. Godfrey, jun., of New York, calls "shoe-leather" epidemiology to distinguish it from the "swivel-chair" epidemiology based on card-indexing mixed groups of the population. It may involve, as he remarks, going out on the highways, byways and alleys, walking the streets and climbing the stairs, or bumping over country roads in order to ferret out the sources of infection. Perhaps we are too prone to be satisfied with lining up contacts of known cases. When a source of infection has been found, any environmental conditions which are unsatisfactory must be improved or the case must be removed.

Finally, there is no logic in widening our range for the detection of new cases if we are not prepared to provide facilities for dealing with them when they are discovered. No brief has been made out for the wholesale segregation of open cases; there is no justification for the statement that improved housing conditions in themselves will contribute materially to the reduction of the tuberculosis death-rate, as McGonigle has shown in Stockton-on-Tees. There is in fact no proof that any single environmental factor—not even infection under good environmental conditons—will increase the attack-rate from tuberculosis. But there is proof that by raising the standard of environment in the presence of infection or alternatively of removing sources of massive infection from bad environment we have the surest method of limiting the spread of infection and therefore of reducing the morbidity. So long as tuberculosis remains a clinical entity we may not slacken any effort to bring relief to the individual patient. But the time has come to take much more active steps in the preventive field. We have been attending to casualties without dealing with the human factories which create these casualties. Mass radiology will help us to detect them. Until public opinion empowers us to investigate by clinical, radiological, statistical or any other means the nests of infection which keep up the death-rate and maintain the morbidity from tuberculosis we shall not obtain the results we desire and which our enthusiasm deserves.

* This article has been prompted by a monograph, to be published (says *The Lancet* of January 24th) in the near future, for which Dr. F. R. G. Heaf, Dr. G. Lissant Cox, Dr. D. A. Powell and Dr. J. B. McDougall accept responsibility.